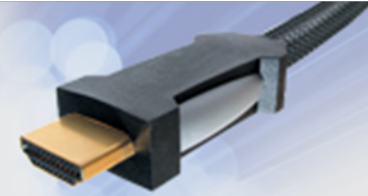




HDMI Type D – (MICRO)

Presented by: Scott Sommers

Molex Incorporated

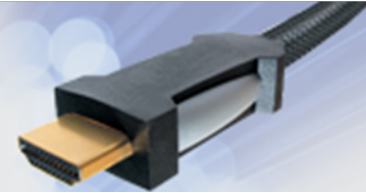


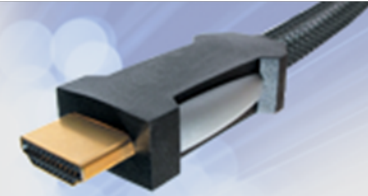
molex[®]

one company › a world of innovation

- Second largest connector manufacturer
- \$3.33 billion in global sales
- 45 manufacturing facilities in 17 countries
- 25 development centers in 15 countries
- More than 100,000 products
- Dedicated team of more than 32,000 professionals

Strong Global Presence

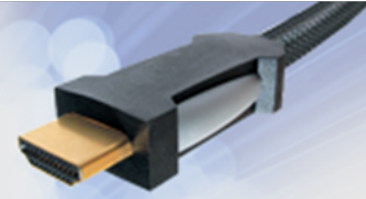




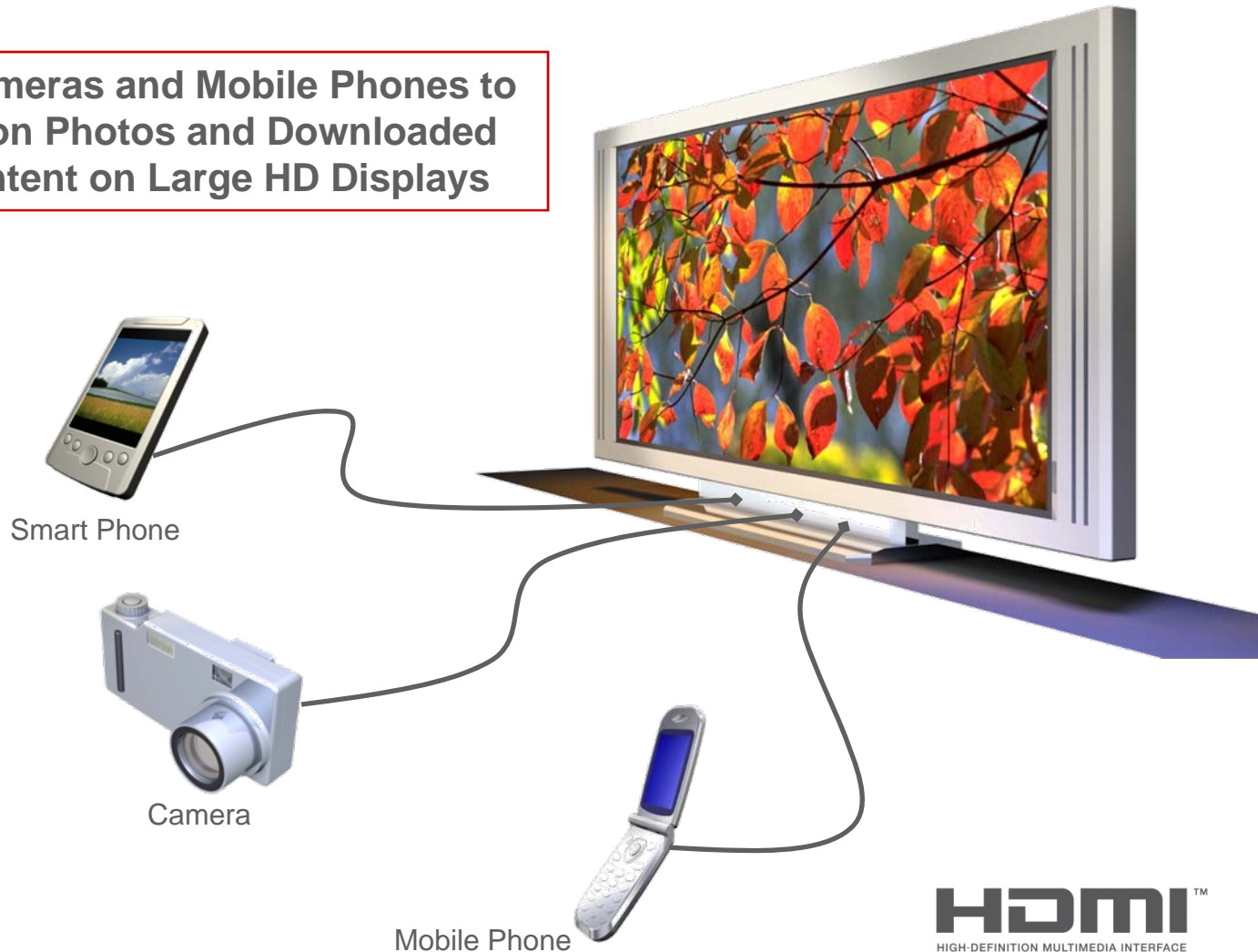
- Market Requirements for Micro HDMI
- Molex Connector Design Details
- Preliminary Mechanical Test Summary
- Preliminary Electrical Test Summary



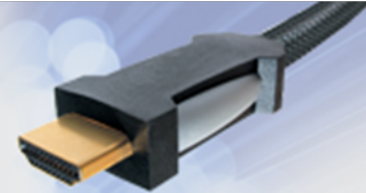
Market Need for Micro HDMI



To Enable Digital Cameras and Mobile Phones to View High Resolution Photos and Downloaded High Definition Content on Large HD Displays



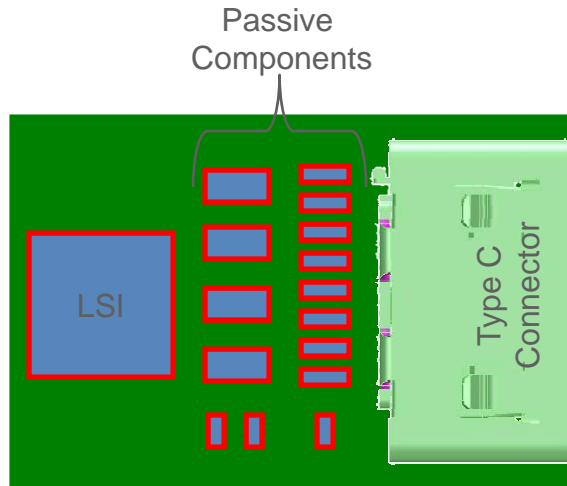
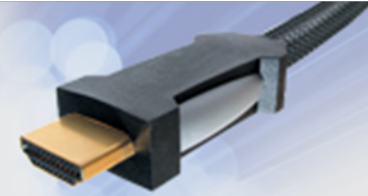
HDMI Committee Background



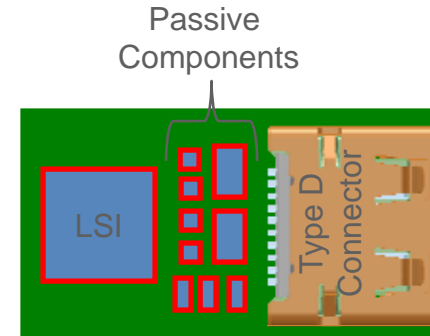
- Current HDMI Type C (Mini) Connector and Total Design Solution is Too Large for Current Mobile Devices
- DSC and Mobile Phone Makers will Require a Fine Pitch Micro Connector
- HDMI Committee Began Development of Micro HDMI Solution from March 2008 and Molex was chosen to lead the connector development
- Micro HDMI Added to the Standard HDMI Specification
- Specification Release: June 2009



HDMI Size Reduction Target



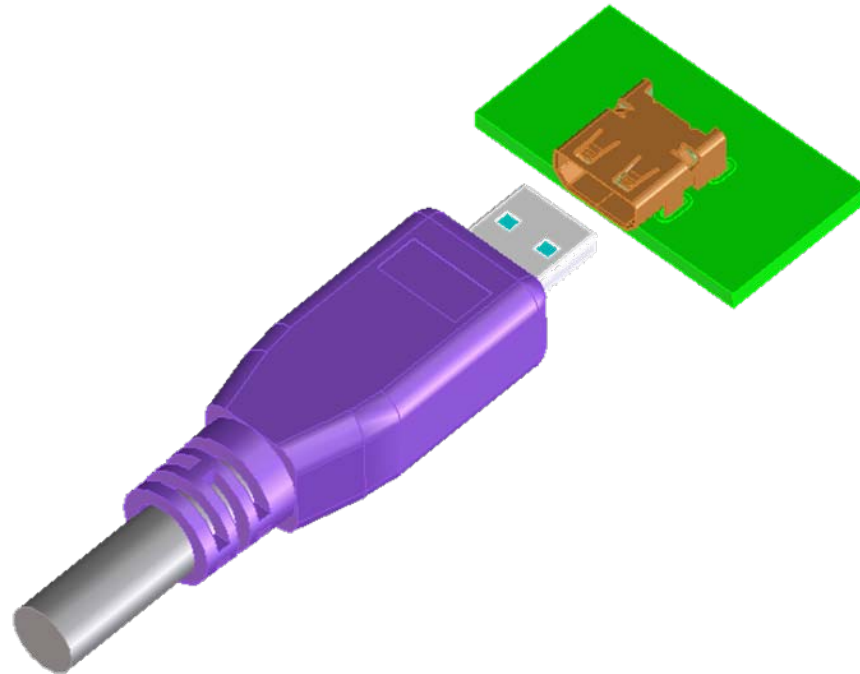
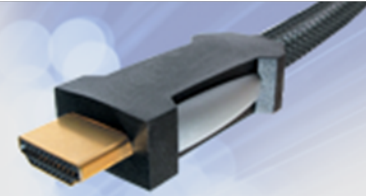
Mini HDMI Type C



Micro HDMI Type D

Total System Solution  **50%+ Smaller**

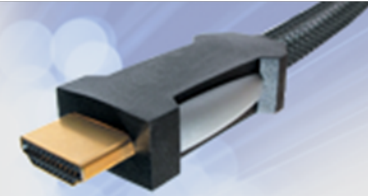




Molex Micro HDMI Connector Solution



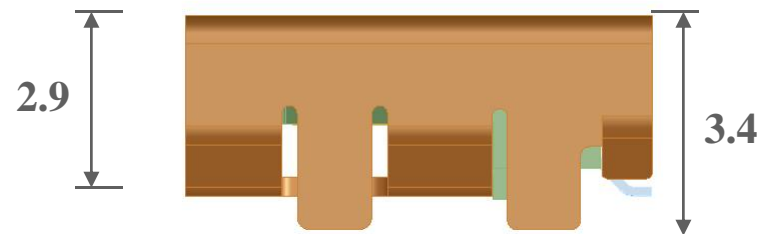
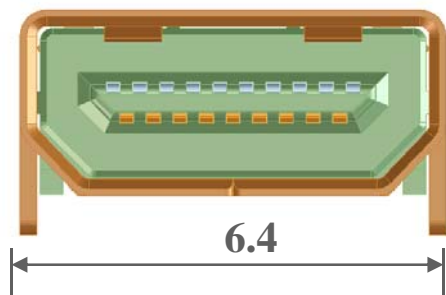
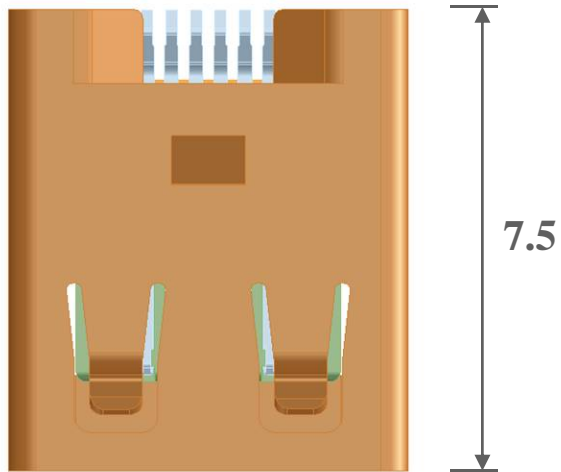
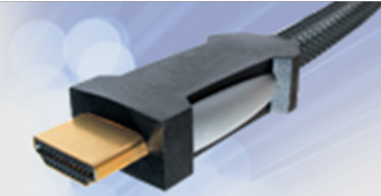
Micro HDMI Overview



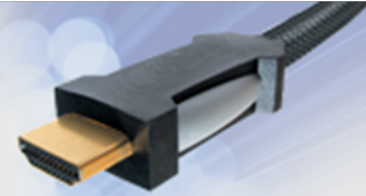
- 0.4mm Pitch I/O System (PCB to Cable)
- 2 Rows of Contacts, 19ckts
- Durability Cycle Life = 5000 min
- Connector Size (max) Requirements:
 - Width : 6.4mm
 - Height : 2.9mm
 - Depth : 7.3mm
- Connector system meets requirements of HDMI 1.4 Specification
 - Molex Micro HDMI Meet HDMI 1.3 Mechanical Specification
 - Molex Micro HDMI Meet Standard HDMI 1.3 Electrical Specification



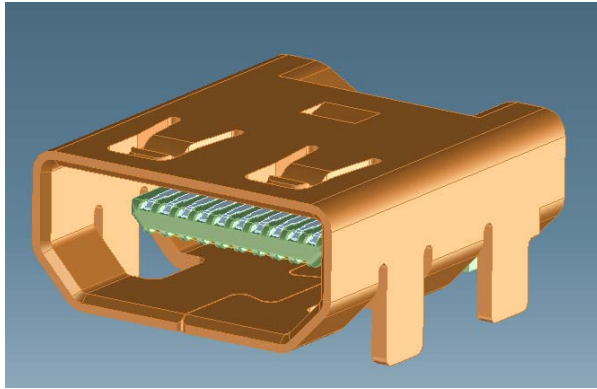
Micro HDMI Overview



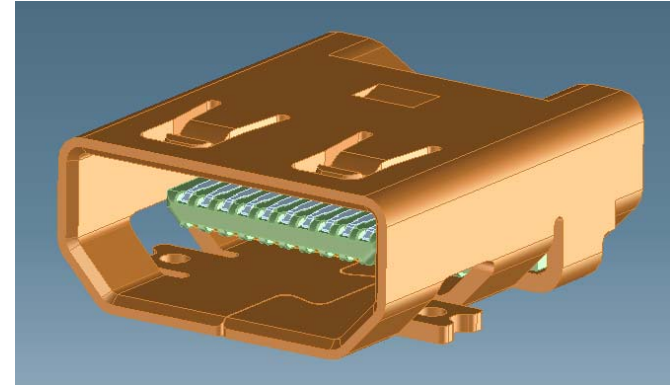
Micro HDMI Overview



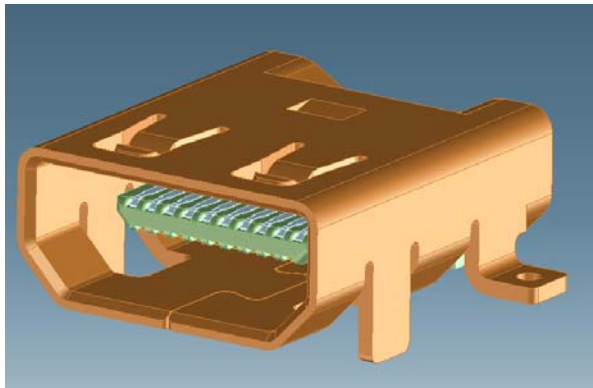
Product Offering



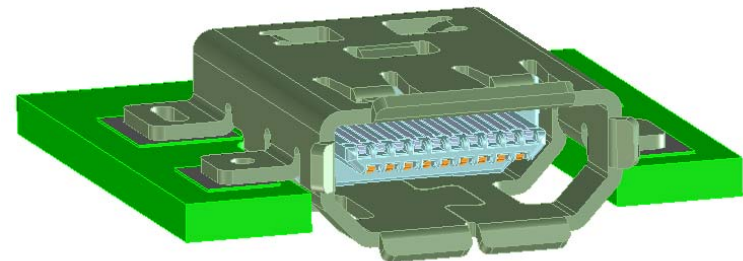
Through Hole Type



Full SMT Type

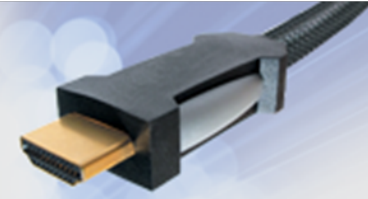


Hybrid Through Hole SMT Type

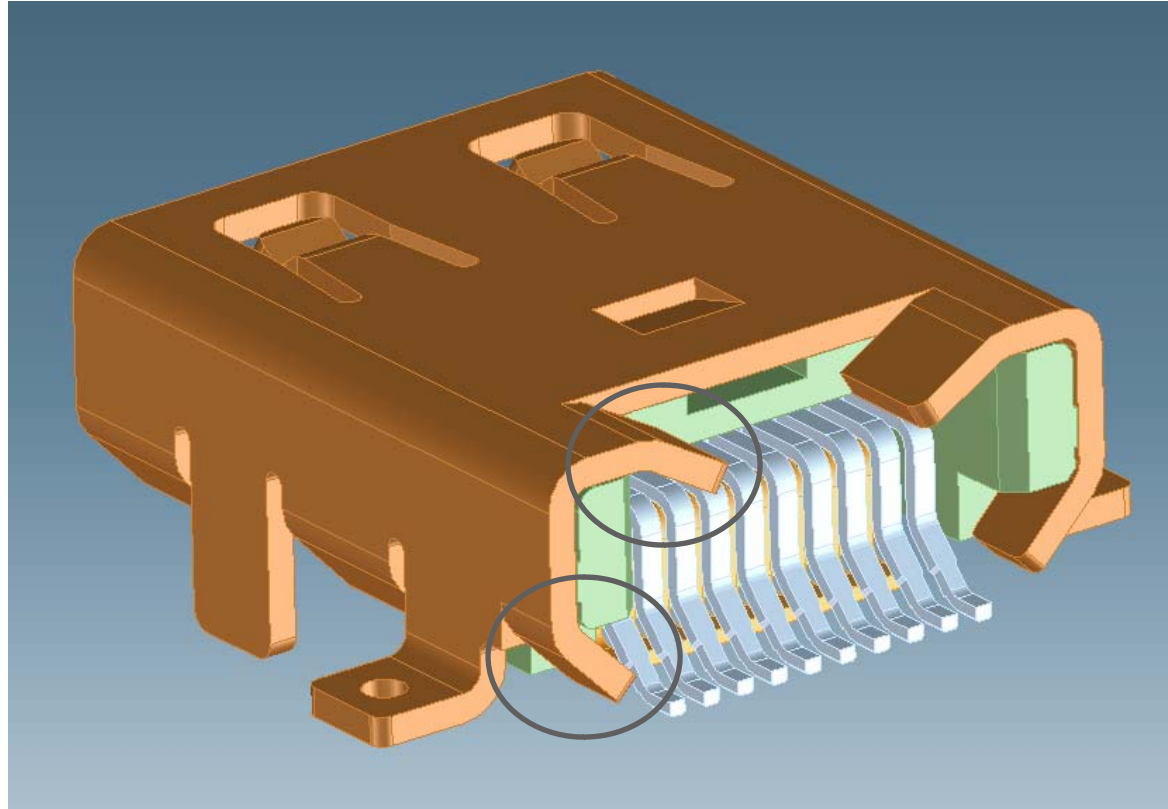


Mid Mount Type

Micro HDMI Overview

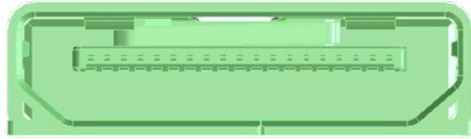
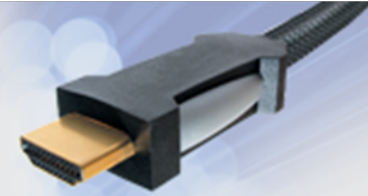


Shell Design Details

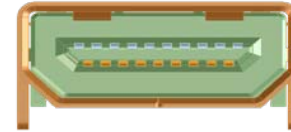


Rear shell over housing to strengthen connector prevent damage from over insertion of the plug and drops.

HDMI Size Comparison



HDMI TYPE-C






HDMI TYPE-D

Connector Foot Print  45% Smaller

Connector Volume  52% Smaller

	Mini HDMI TYPE C	Micro HDMI TYPE D
Pitch	0.4mm	0.4mm
Circuit Size	19	19
Contact Rows	1	2
Height (H)	3.20mm	2.9mm
Width (W)	11.20mm	6.4mm



			
	Type A	Type C (Mini)	Type D (Micro)
Pitch 间距	0.50mm	0.40mm	0.40mm
Circuit Size 电路数	19	19	19
Contact Rows 行数	Dual Rows	Single Row	Dual Rows
Height (H) 高度	6.18mm	3.20mm	2.90mm
Width (W) 宽度	15.00mm	11.20mm	6.50mm

Type D compared to Type C:

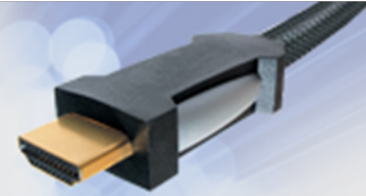
■ Footprint 37% smaller

■ Volume 43% smaller




D型相比C型:

■ 面积较小37%

■ 体积较小43%



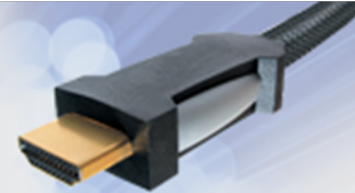
HDMI* Type D Micro Connectors 微型连接器

	Description	Order Number	Housing	Plating	Packaging
	HDMI Type D Micro Connector SMT Type 表面贴焊式	46765-0001	LCP UL94V-0	30 μ" Gold	Tape & Reel with Kapton Tape
	HDMI Type D Micro Connector Through-Hole Type 通孔焊接式	46765-1001			
	HDMI Type D Micro Connector Hybrid Type 混合焊接式	46765-2001			

- 0.40mm pitch, dual-row contact
- Durability up to 5,000 cycles
- Shield: SMT, Through-hole and Hybrid versions
- Friction Lock feature
- Meets HDMI Specification Version 1.4

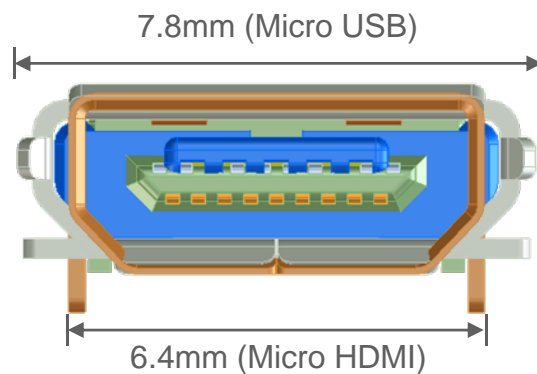


Micro HDMI & Micro USB Comparison

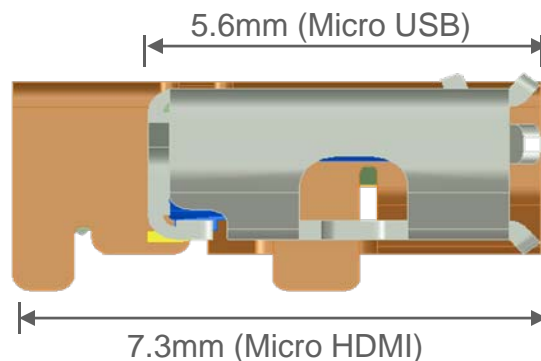


	Micro HDMI	Micro USB
Pitch	0.4mm	0.65mm
Circuit Size	19	5
Contact Rows	2	1
Height (H)	2.9mm	2.94mm
Width (W)	6.4mm	7.8mm
Depth (D)	7.3mm	5.6mm

- Micro HDMI has 2 rows of contacts and results in a larger depth dimension than the Micro USB with 1 row of contacts
- Micro HDMI and Micro USB are Dimensionally Different and Will Not Allow Inter-Mating

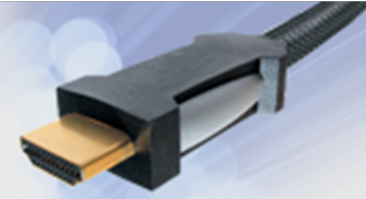


HDMI Type D / Micro USB Front View Overlay

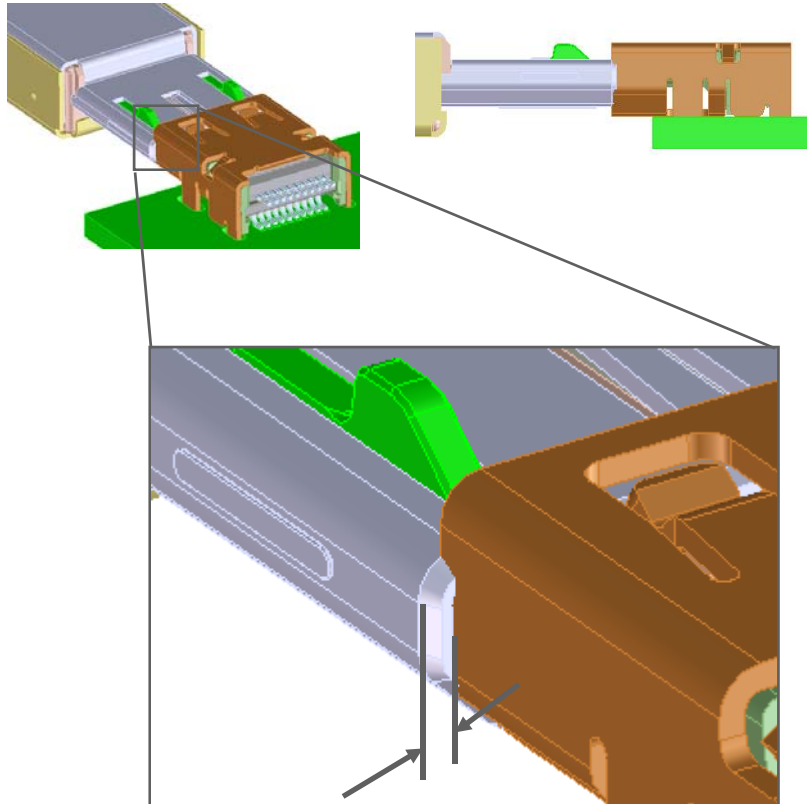


HDMI Type D / Micro USB Side View Overlay

Micro HDMI & Micro USB Comparison

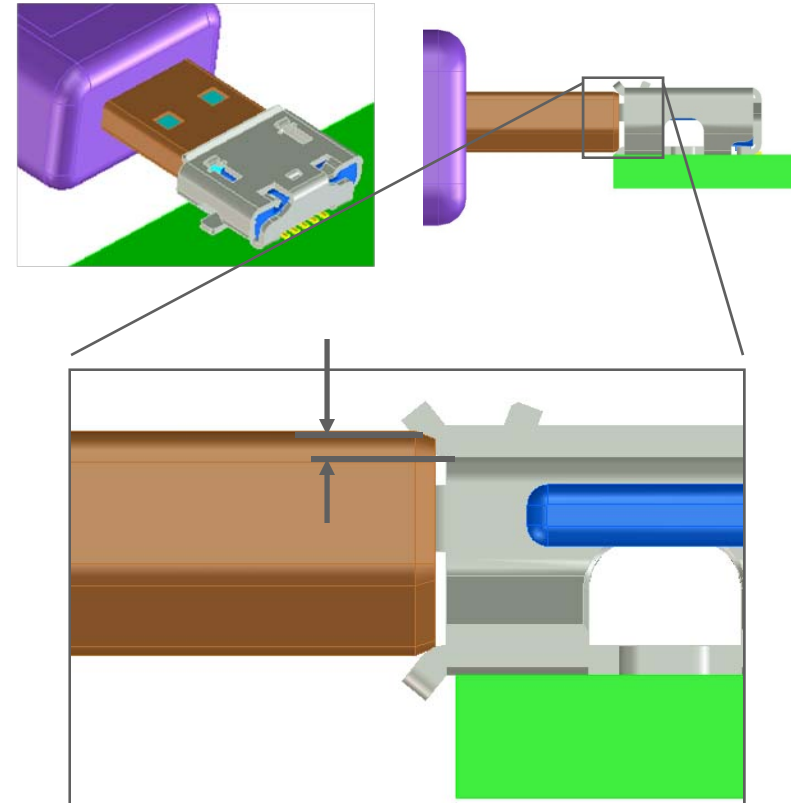


Micro USB Plug to HDMI Type D Receptacle



0.255mm (Per side)
No Mating

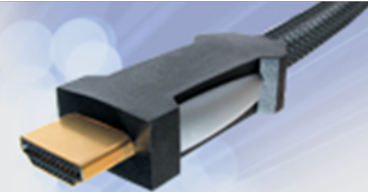
HDMI Type D Plug to Micro USB Receptacle



0.4mm (Total Overlap)
No Mating

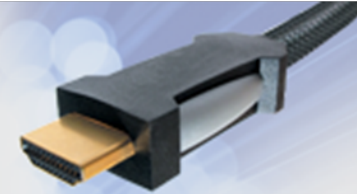
Micro HDMI & Micro USB Will Not Inter-Mate

Mechanical Test Summary



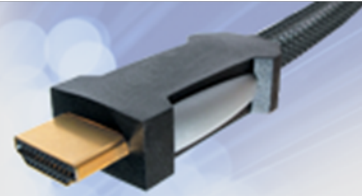
Item	Test Condition	Requirement	Results	Judgement
<u>Cycle Durability</u>	Measure contact and shell resistance after automatic cycling: HDMI type D: 5,000 cycles at 100 +/- 50 cycles per hour	<p>Contact Resistance:</p> <p>Contact: Change from initial value: 30 miliohms maximum.</p> <p>Shell: Change in initial value: 50 miliohms maximum.</p>	<p>Contact: Change from initial value: 6.37 miliohms maximum</p> <p>Shell: Change in initial value: 50 miliohms maximum</p>	Preliminary Samples Within Specification
<u>Insertion Force</u>	Insertion Speed: 25mm/minuite (ANSI/EIA-364-13)	44.1N maximum	27.8N	Preliminary Samples Within Specification
<u>Withdrawal Force After Cycle Durability</u>	Withdrawal Speed: 25mm/minuite (ANSI/EIA-364-13)	5N minimum 25N maximum	12N	Preliminary Samples Within Specification
<u>Cable Flex Test</u>	100 cycles in each 2 planes Dimension X=3.7 x Cable Diameter (ANSI/EIA-364-41C, Condition I)	Discontinuity: 1µsec maximum Dielectric Withstanding Voltage Insulation Resistance	No Breakdown	Preliminary Samples Within Specification
<u>Wrenching Strength</u>	Perpendicular force is applied to the plug when mated at a distance of 15mm from the edge of the receptacle	No plug or receptacle damage: 0-25N	<p>Upward direction: 27.9N</p> <p>Downward direction: 39.0N</p> <p>Right/Left direction: 47.8N</p>	Preliminary Samples Within Specification
<u>Peel Strength of Soldered Connector</u>	Soldered connector is pulled up from PCB in the vertical direction	Peeling Force: 150 N Min.	PCB Thickness 1.6mm: 156N	Preliminary Samples Within Specification

Electrical Test Summary

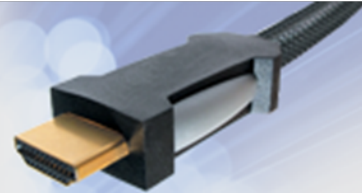


Item	Test Condition	Requirement		Judgement
Transmission Loss		0-825 MHz	>-8dB	Preliminary Samples Within Specification
		825-2475 MHz	>-21dB	
		2476-4125 MHz	>-30dB	
		4126 MHz	>-50dB	
TDR Impedance	Up to 1ns from connecting point	Connection point and transmission area	100Ω±15%	
	1ns-2.5ns from connecting point	Cable area	100Ω±10%	
Eye Pulse Mask	Tr=75ps(20-80%)	Amplitude	±75mV	
		Normalized time	0.35-0.65UI	
Far End Crosstalk			<-20dB	
Intra-Pair Skew	Maximum Cable Assembly		151ps	
Inter-Pair Skew	Maximum Cable Assembly		2.42ns	

Type D and Type A cables




Molex Micro HDMI Cable Assembly

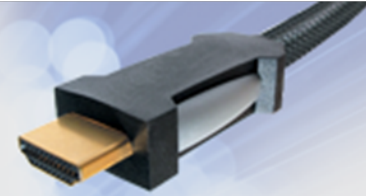


HDMI Type A to Micro HDMI type D cable assembly

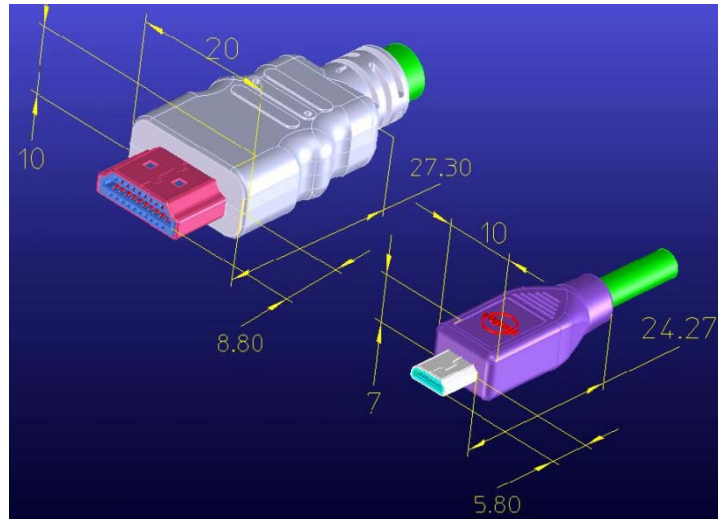


HDMI* Type D Micro Cable Assembly 电缆组件				
	Description	Order Number	Cable Length	Features and Benefits
	HDMI Type D-to-Type A Cable Assembly HDMI D型-至-A型 电缆组件	68786-0001	1.00m	* Compact and stylish overmold design * Flexible and small cable
		68786-0002	1.50m	
		68786-0003	2.00m	

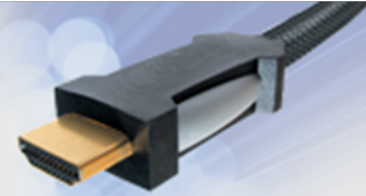
Molex Micro HDMI Cable Assembly Features



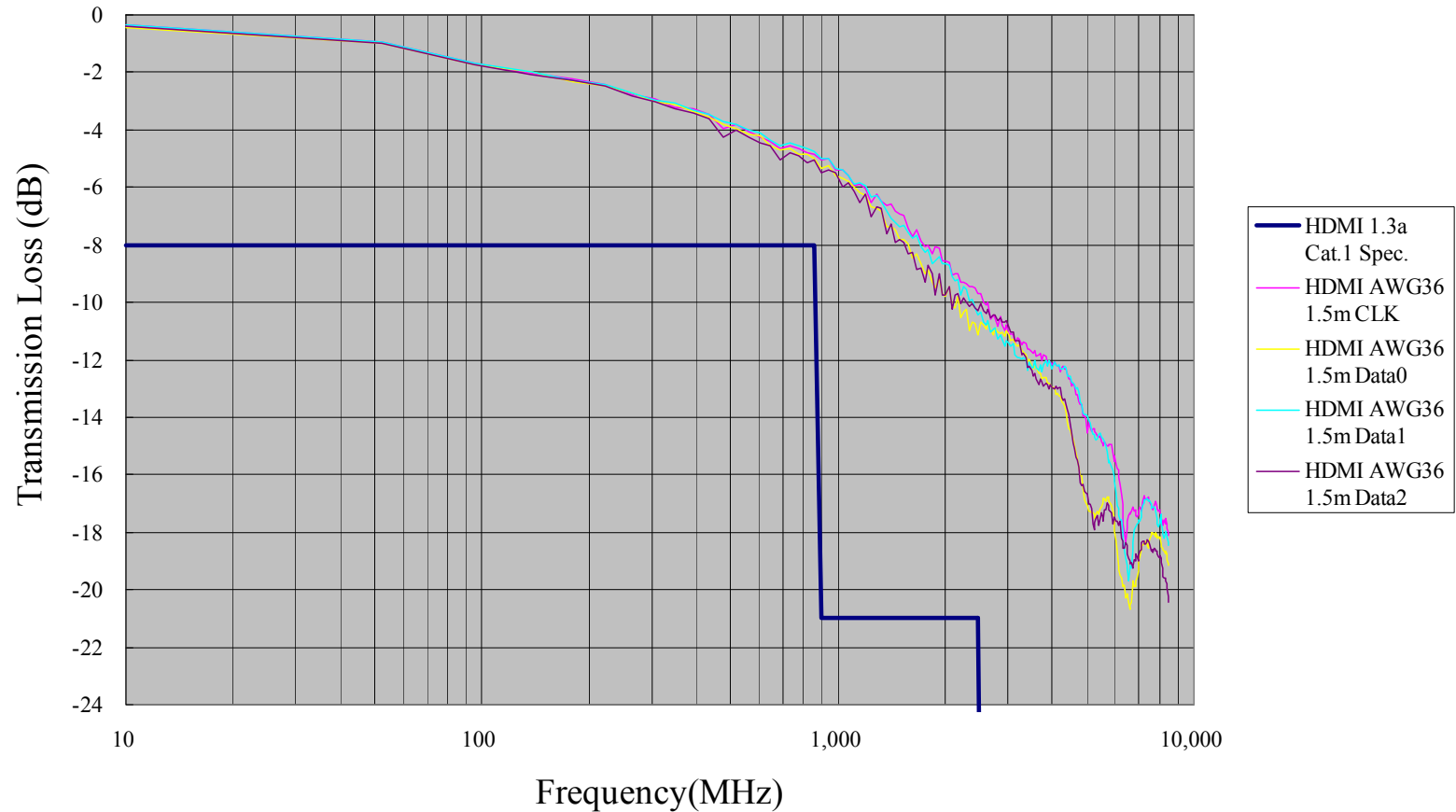
- Stylish and compact overmold design, half the size of HDMI Type A overmold
- Flexible and soft cable with Outer Diameter of 4mm
- Standard length of cable is up to 2 meters. Customer length is available
- HDMI version 1.4 Category 1 and 2 compliant
- Micro HDMI to HDMI Type A short Cable adapter is available



Transmission Loss

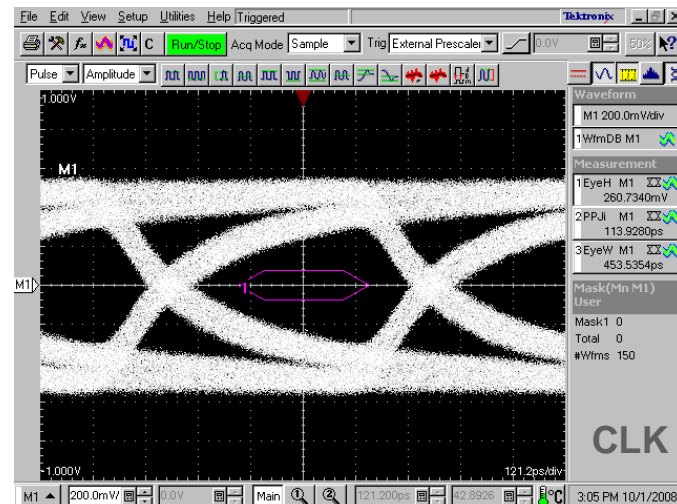
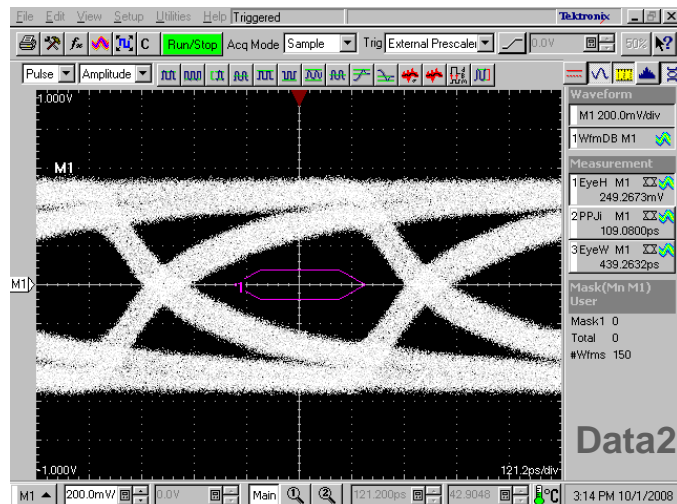
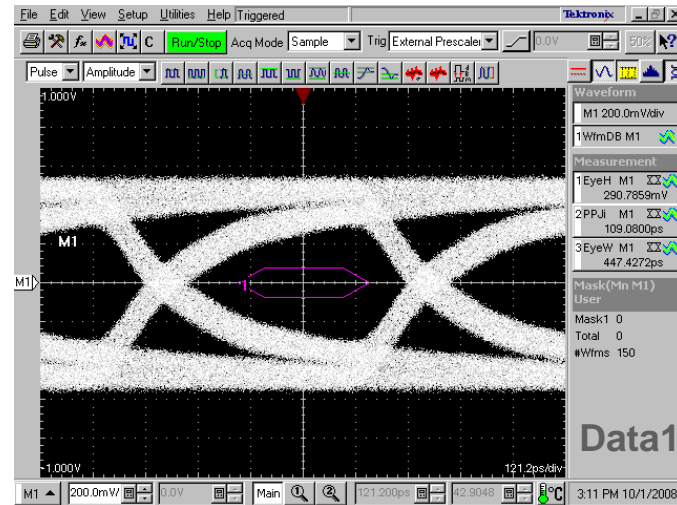
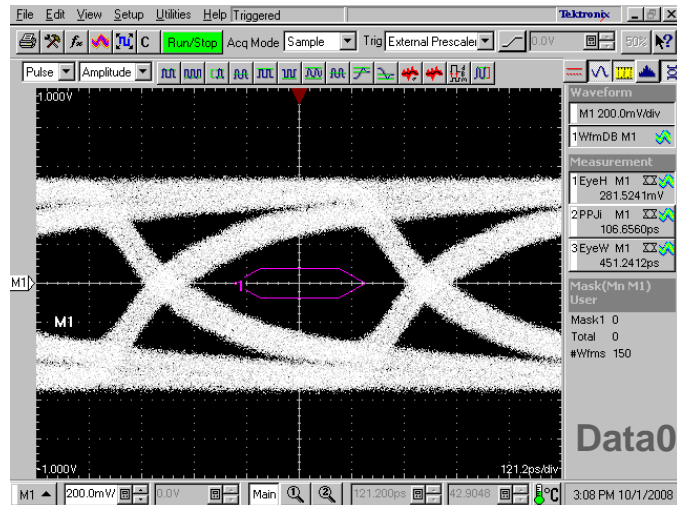
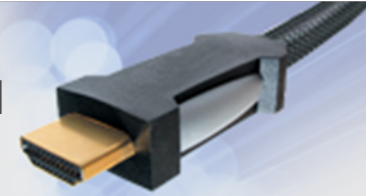


HDMI-typeD AWG36 1.5m harness Transmission Loss (for Cat. 1)

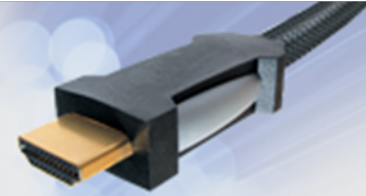


Pulse Mask

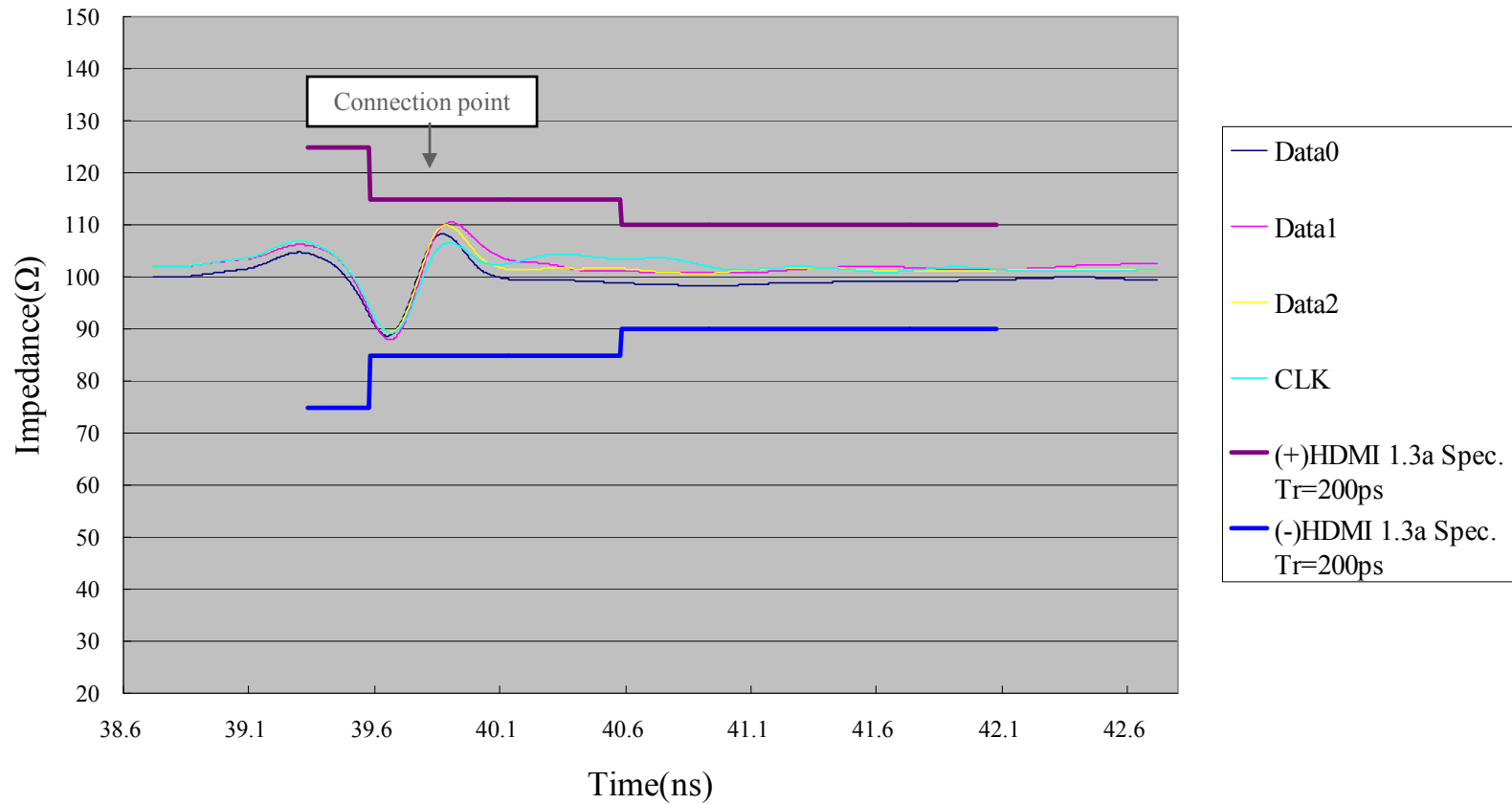
AWG36 1.5m Harness
Bit Rate 1.65Gbps, PN=2²³-1
NRZ (No Emphasize)



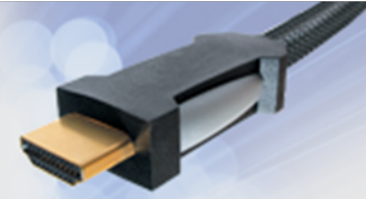
TDR Impedance



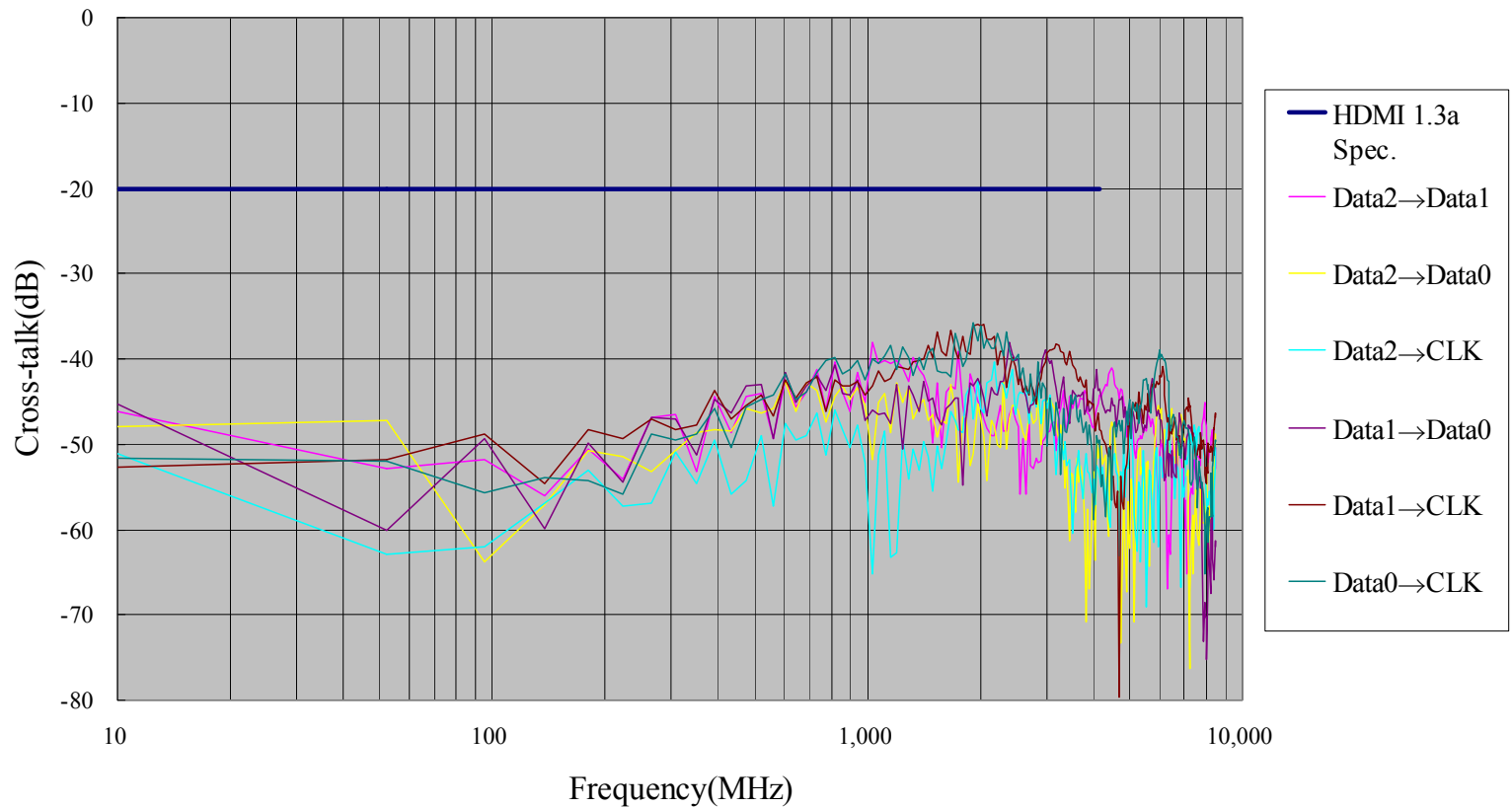
HDMI-typeD AWG36 1.5m harness TDR Impedance



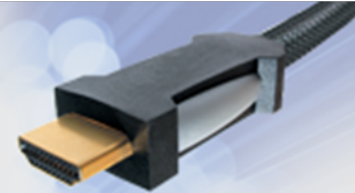
Far End Crosstalk



HDMI-typeD AWG36 1.5m harness Far End Cross-talk



Intra-Pair Skew, Inter-Pair Skew



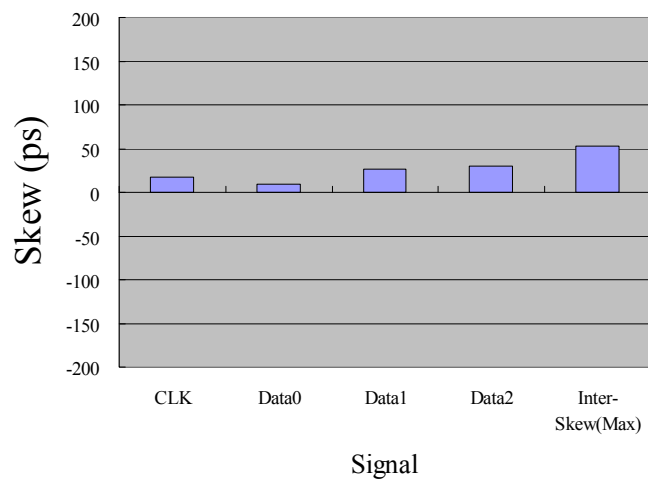
HDMI 1.3a spec.

	Category 1	Category 2
Intra-Pair	151ps	112ps

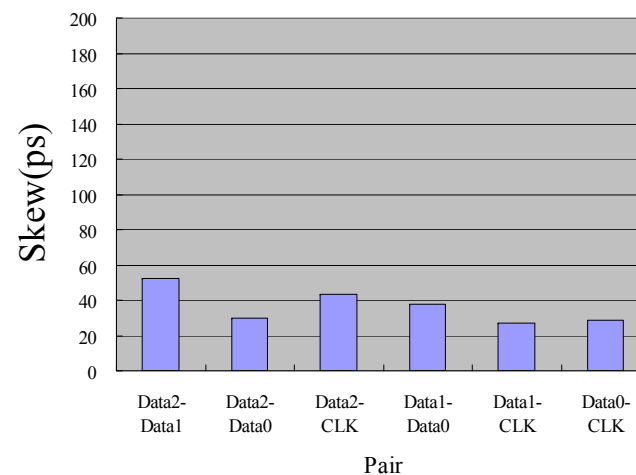
HDMI 1.3a spec.

	Category 1	Category 2
Inter Pair	2,420ps	1,780ps

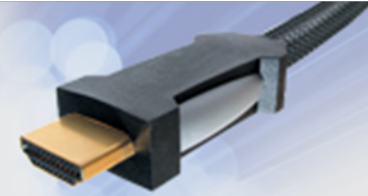
**HDMI-typeD AWG36 1.5m Harness
Intra-Pair Skew**



**HDMI-typeD AWG36 1.5m harness
Inter-Pair Skew**

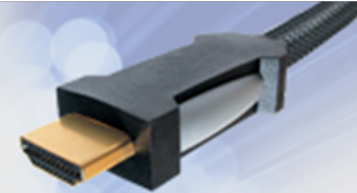


Conclusion



- HDMI Type D connector is the world's smallest commoditized I/O connector system
- 19 pin, 0.4mm Dual Row pitch
- Part of the HDMI 1.4 specification
- Connectors and Cable Assemblies available now from Molex
- www.molex.com





Thank You!

molex[®]

one company › a world of innovation